Swarup Ranjan Behera, Ph.D.

swarupranjanbehera@gmail.com 09439872747
Linkedin Personal Website Google Scholar Github

Professional Experience

Nov 2024 – Present **Data Scientist,** NLP, ExxonMobil (EMSTPL), Bengaluru, India.

Sept 2021 – Oct 2024 **Research Scientist,** NLP-Speech, Reliance Jio AICoE, Hyderabad, India.

Skills

Languages Python, R, C, Matlab.

Frameworks PyTorch, Tensorflow, Hugging Face Transformers, Databricks, FastAPI, Gradio.

Expertise Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), Seq-to-Seq Tasks, Cross-Lingual Tasks, NLU, NLG, Conversational AI, Chatbots, Audio Language Models (ALMs), and Vision Language Models (VLMs).

Misc. CI-CD, Docker, Kubernetes, Azure, MySQL, MongoDB, GitHub, Linux, LaTeX.

Products

2023 **Call Audit Automation**
Engineered a large-scale speech and text analytics system for call centers, automating compliance audits and quality assessments. Designed a robust NLP pipeline for processing multilingual conversational data, leveraging sentiment analysis and domain-specific language models to enhance customer experience. Deployed at Jio and Ajio call centers, achieving over 95% accuracy in automated call evaluations.

2022 **Patient Notes Conversion**
Developed an AI-driven clinical documentation system that converts spoken patient interactions into structured medical notes, streamlining physician workflows. Designed a specialized NLP pipeline for processing medical text and fine-tuning domain-specific language models. Currently operational at Reliance Hospital, generating SOAP notes with 94% accuracy, significantly reducing manual documentation effort.

Applied Projects

2025 **Fleet Optimization**
Designing an advanced LLM-driven pipeline on Databricks to systematically classify maintenance logs from pump and motor repairs, mapping engineer-reported issues to standardized failure categories. Employing zero-shot and few-shot learning with RAG and LangChain to enhance anomaly detection by correlating actual repairs with expected maintenance patterns. Synthesizing high-fidelity training data using LLMs to fine-tune lightweight models for scalable deployment.

Leak Investigation
Developing a specialized LLM-powered framework on Databricks to extract critical insights from leak descriptions in oil well equipment, accurately identifying failure components, spilled substances, and root causes. Integrating zero-shot and few-shot learning with RAG and LangChain to refine contextual understanding and improve precision. Generating domain-specific synthetic datasets via LLMs to train compact models for real-time fault detection and predictive maintenance.

Applied Projects (continued)

2024 **Indic LLM**
Worked on developing Indic LLMs by extending the vocabulary of pretrained tokenizers and fine-tuning on multilingual Indic datasets like Sangraha. Focused on adapting open-source models such as Mistral and Llama to improve their effectiveness for Indian languages.

Agriculture LLM
Contributed to building specialized LLMs for agriculture by fine-tuning open-source models like Mistral and Llama on agricultural datasets. Integrated RAG to enhance retrieval and generate context-aware insights.

Art VLM
Built an Art VLM by fine-tuning open-source models like LLaVA on art datasets for improved visual art understanding, encompassing captioning, retrieval, and VQA.

2023 **Agriculture Time Series Analysis**
Developed time series models like ARIMA, LSTM, and Transformer to enhance decision-making and resource management in agriculture, advancing towards building Time Series LLMs.

PDF Voicebot
Developed customized PDF voicebots integrating RAG on PDF documents with open-source LLMs for effective answer generation, deployed successfully across various domains.

2022 **Hospital Voicebot**
Implemented a voice bot system using ASR, Rasa NLU, and TTS modules to streamline call center operations for scheduling doctor appointments. Achieved a workload reduction of 20-30%.

Aspect-based Sentiment Analysis
Developed a model to extract aspects and sentiment from customer-agent interactions by fine-tuning a transformers-based model with domain-specific data. Integrated vernacular translation, enabling analysis of customer issues and sentiments in Indian languages.

2021 **Contract Review AI (CRAI)**
Developed a CRAI system that autonomously extracts and identifies key clauses from legal contracts, leveraging a BERT-based model for enhanced contract analysis and clause identification.

Education

2015 – 2021 **Ph.D.,** CSE, IIT Guwahati.
Thesis: *Learning Player-specific Strategies using Cricket Text Commentary.*

2013 – 2015 **M.Tech.,** CSE, IIT Guwahati.
Thesis: *Spectral Clustering Using Convex and Constrained Settings.*

2008 – 2012 **B.Tech.,** CSE, VSSUT Burla.
Thesis: *A Novel Ontology Based Entity Relationship Model.*

Selected Publications

1. O. C. Phukan, M. M. Akhtar, S. R. Behera, *et al.*, "Strong alone, stronger together: Synergizing modality-binding foundation models with optimal transport for non-verbal emotion recognition," in *ICASSP*, 2025.
2. S. R. Behera, A. Dhiman, K. Gowda, and A. S. Narayani, "Fastast: Accelerating audio spectrogram transformer via token merging and cross-model knowledge distillation," in *INTERSPEECH*, 2024.
3. S. R. Behera, O. C. Phukan, P. Mallick, A. S. Narayani, A. B. Buduru, and S. Rajesh, "Towards multilingual audio-visual question answering," in *INTERSPEECH*, 2024.

4. S. Jain, O. C. Phukan, S. R. Behera, A. B. Buduru, and R. Sharma, *Sequifi: Mitigating catastrophic forgetting in speech emotion recognition with sequential class-finetuning*, 2024. arXiv: 2410.12567.
5. O. C. Phukan, S. R. Behera, M. M. Akhtar, A. B. Buduru, and R. Sharma, *Beyond speech and more: Investigating the emergent ability of speech foundation models for classifying physiological time-series signals*, 2024. arXiv: 2410.12645.
6. O. C. Phukan, S. R. Behera, Girish, *et al.*, *Representation loss minimization with randomized selection strategy for efficient environmental fake audio detection*, 2024. arXiv: 2409.15767.
7. O. C. Phukan, S. R. Behera, S. Singh, *et al.*, *Avengers assemble: Amalgamation of non-semantic features for depression detection*, 2024. arXiv: 2409.14312.
8. O. C. Phukan, S. Jain, S. R. Behera, A. B. Buduru, R. Sharma, and S. R. M. Prasanna, *Are music foundation models better at singing voice deepfake detection? far-better fuse them with speech foundation models*, 2024. arXiv: 2409.14131.
9. O. C. Phukan, D. Koshal, S. R. Behera, A. B. Buduru, and R. Sharma, *Multi-view multi-task modeling with speech foundation models for speech forensic tasks*, 2024. arXiv: 2410.12947.
10. O. C. Phukan, D. Singh, S. R. Behera, A. B. Buduru, and R. Sharma, *Investigating prosodic signatures via speech pre-trained models for audio deepfake source attribution*, 2024. arXiv: 2412.17796.
11. S. R. Behera, K. M. Injeti, J. S. K. Patibandla, P. K. Pokala, and B. R. Pailla, "Aquallm: Audio question answering data generation using large language models," *arXiv preprint arXiv:2312.17343*, 2023.
12. S. R. Behera, P. B. Reddy, A. M. Tripathi, B. R. Megavath, and T. Karavadi, "Towards multi-lingual audio question answering," in *INTERSPEECH*, 2023.
13. S. R. Behera and V. V. Saradhi, "Cricket player profiling: Unraveling strengths and weaknesses using text commentary data," *arXiv preprint arXiv:2311.06818*, 2023.
14. A. M. Tripathi, S. R. Behera, and K. Paul, "Adv-ifd: Adversarial attack datasets for an intelligent fault diagnosis," in *IJCNN*, 2022.
15. A. M. Tripathi, S. R. Behera, and K. Paul, "Investigation of performance of visual attention mechanisms for environmental sound classification: A comparative study," in *IJCNN*, 2022.
16. A. M. Tripathi, S. R. Behera, and K. Paul, "K-defensive bit planes: Defense against adversarial attacks," in *IJCNN*, 2022.
17. A. M. Tripathi, S. R. Behera, and K. Paul, "Reverse adversarial attack to enhance environmental sound classification," in *IJCNN*, 2022.
18. S. R. Behera and V. V. Saradhi, "Learning strength and weakness rules of cricket players using association rule mining," in *MSLA21, ECML/PKDD*, 2021.
19. S. R. Behera and V. Saradhi, "Mining temporal changes in strengths and weaknesses of cricket players using tensor decomposition," in *ESANN*, 2020.
20. S. R. Behera, P. Agrawal, A. Awekar, and V. S. Vedula, "Mining strengths and weaknesses of cricket players using short text commentary," in *ICMLA*, 2019.

Awards and Achievements

2020-24 **PCM and Reviewer**, ECML-PKDD, IEEE VIS, TASLP, ICASSP, WACV, ICME.

2020 **Best Research Award**, Ohio State Sports Analytics Association Conference, Columbus, USA.

2013-21 **Grants and Fellowships**, MHRD Government of India Fellowship for MTech and PhD.

2013 **GATE 2013**, All India Rank 696.

References

Dr. Vijaya Saradhi Vedula
Associate Professor
Department of CSE,
IIT Guwahati.
saradhi@iitg.ac.in

Dr. Amit Awekar
Associate Professor
Department of CSE,
IIT Guwahati.
amitawekar@gmail.com

Prof Ashish Anand
Professor
Department of CSE,
IIT Guwahati.
anand.ashish@iitg.ac.in